

APPENDIX H.

Success of Businesses in the Arizona Construction and Engineering Industries

Keen Independent examined the success of minority- and women-owned business enterprises (MBE/WBEs) in the Arizona construction and engineering industries. Keen Independent assessed whether business outcomes for MBEs and WBEs differ from those of non-Hispanic white male-owned businesses (i.e., majority-owned businesses).¹

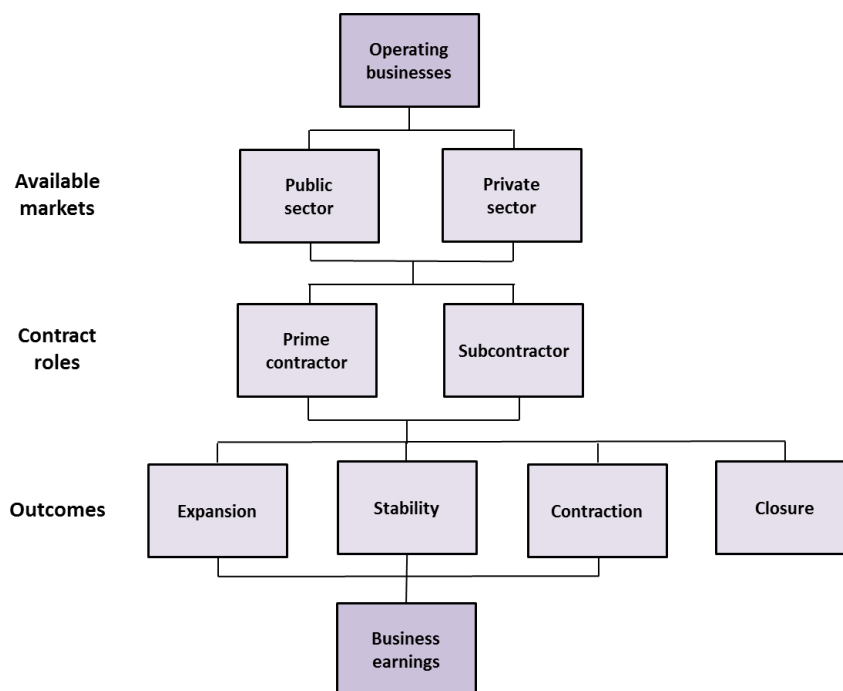
Keen Independent researched outcomes for MBE/WBEs and majority-owned businesses in terms of:

- Participation in public and private sector markets, including contractor roles and sizes of contracts bid on and performed;
- Business closures, expansions, and contractions;
- Business receipts and earnings; and
- Potential barriers to starting or expanding businesses.

Figure H-1 provides a framework for Keen Independent's analyses.

Figure H-1.
Business
outcomes

Source:
Keen Independent
Research



¹ Keen Independent uses the terms "MBEs" and "WBEs" to refer to businesses that are owned and controlled by minorities or women (definitions listed in Appendix A), regardless of whether they are certified or meet the revenue and net worth requirements for DBE certification and regardless of whether they are certified as MBEs or WBEs.

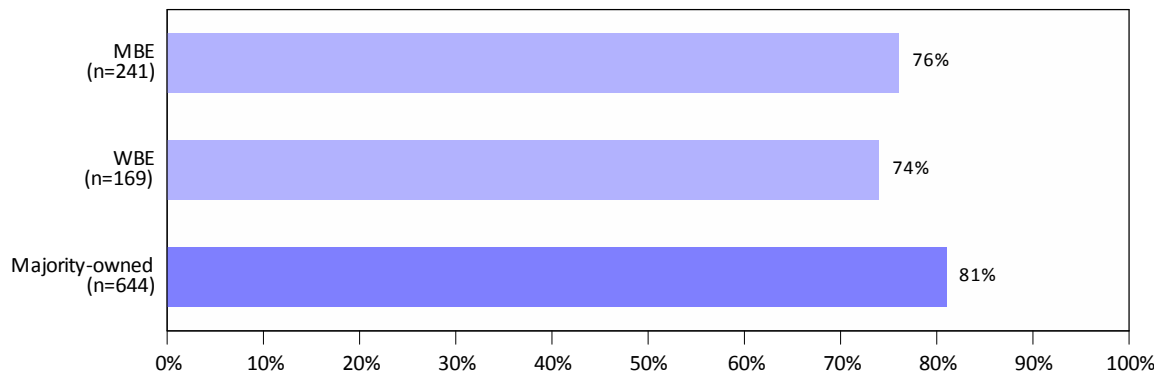
Participation in Public and Private Sector Markets

Keen Independent used information collected as part of the availability analysis to examine whether transportation-related construction and engineering businesses bid on public sector and private sector work, and the extent to which firms work as prime contractors and subcontractors.

Bidding on public sector projects. In the availability interviews, the study team asked firms that reported that they performed transportation-related work whether they had bid on or worked on any part of a public sector project within Arizona in the past seven years.² As shown in Figure H-2, more than 80 percent of majority-owned firms reported that they had bid on or worked on public sector projects. Somewhat fewer MBEs (76%) and WBEs (74%) indicated that they had bid on or worked on public sector projects.

Figure H-2.

Percent of transportation-related businesses that reported bidding or working on a state or local government project in Arizona in the past seven years (any part of a project)



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

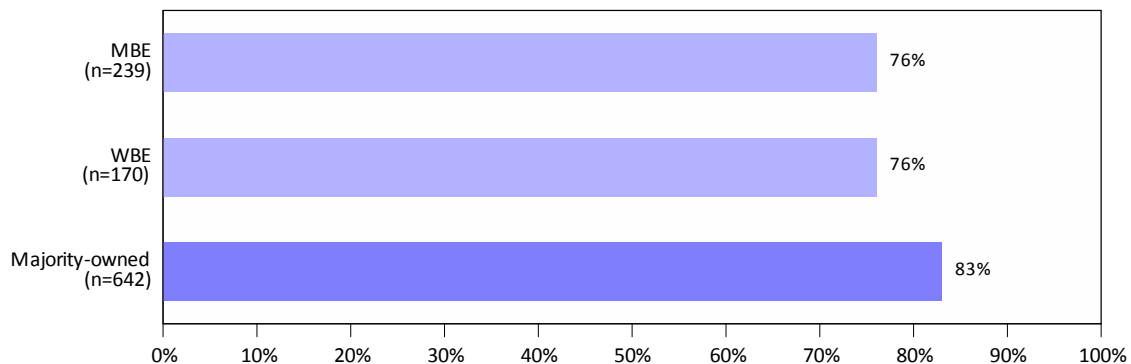
Bidding on private sector projects. Keen Independent also asked businesses involved in transportation work if they had bid on or worked on private sector work in Arizona in the past seven years (any part of a project).³ About 83 percent of majority-owned firms indicated that they had. Relatively fewer MBEs (76%) and white women-owned firms (76%) reported that they had bid on private sector projects.

² Keen Independent deemed a business to have performed or bid on public sector work if it answered "yes" to either of the following questions in availability interviews: (a) "During the past seven years, has your company submitted a bid or a price quote for any part of a contract for a state or local government agency in Arizona?"; or (b) "During the past seven years, has your company worked on any part of a contract for a state or local government agency in Arizona?"

³ Keen Independent deemed a business to have performed or bid on private sector work if it answered "yes" to either of the following questions in availability interviews: (a) "During the past seven years, has your company submitted a bid or a price quote for any part of a contract for a private sector organization in Arizona?"; or (b) "During the past seven years, has your company worked on any part of a contract for a private sector organization in Arizona?"

Figure H-3.

Percent of transportation-related businesses that reported bidding or working on a private sector project in Arizona in the past seven years (any part of a project)



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

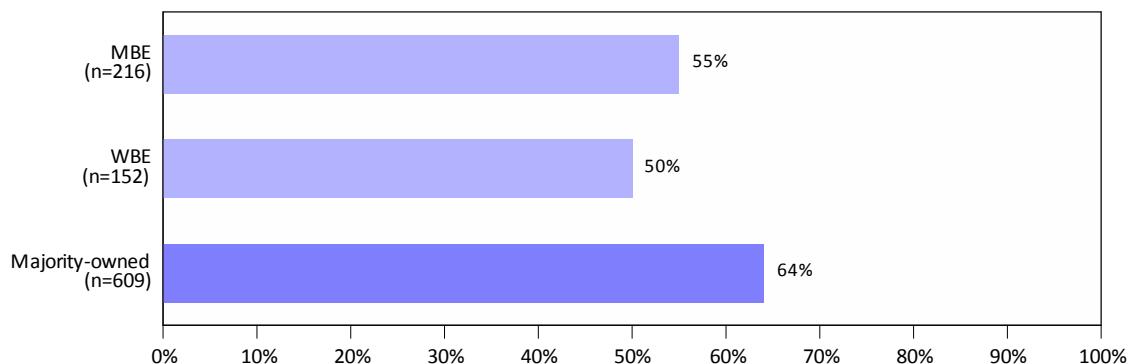
The above results indicate that most transportation-related firms in Arizona pursue both public and private sector work. As discussed in Chapter 4, the study team also conducted in-depth, personal interviews with businesses and trade associations in Arizona. Interviewees confirmed that companies performing transportation contracts in Arizona usually pursue both public and private sector work.

Bidding as a prime contractor. The study team also asked firms involved in transportation-related work whether they had bid as a prime contractor or prime consultant within Arizona in the past seven years. Nearly two-thirds (64%) of majority-owned firms reported bidding as a prime contractor, as presented in Figure H-4. Most of those firms also reported bidding as a subcontractor or supplier. About one-in-ten companies indicated that they only bid as prime contractors.

About one-half of MBEs (55%) and WBEs (50%) said that they had bid as prime contractors or prime consultants. Most of those businesses also bid as a subcontractor or supplier. As with majority-owned firms, few MBEs and WBEs only bid as prime contractors.

Figure H-4.

Percent of businesses that reported bidding or working as a prime contractor or prime consultant on a project in Arizona in the past seven years



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

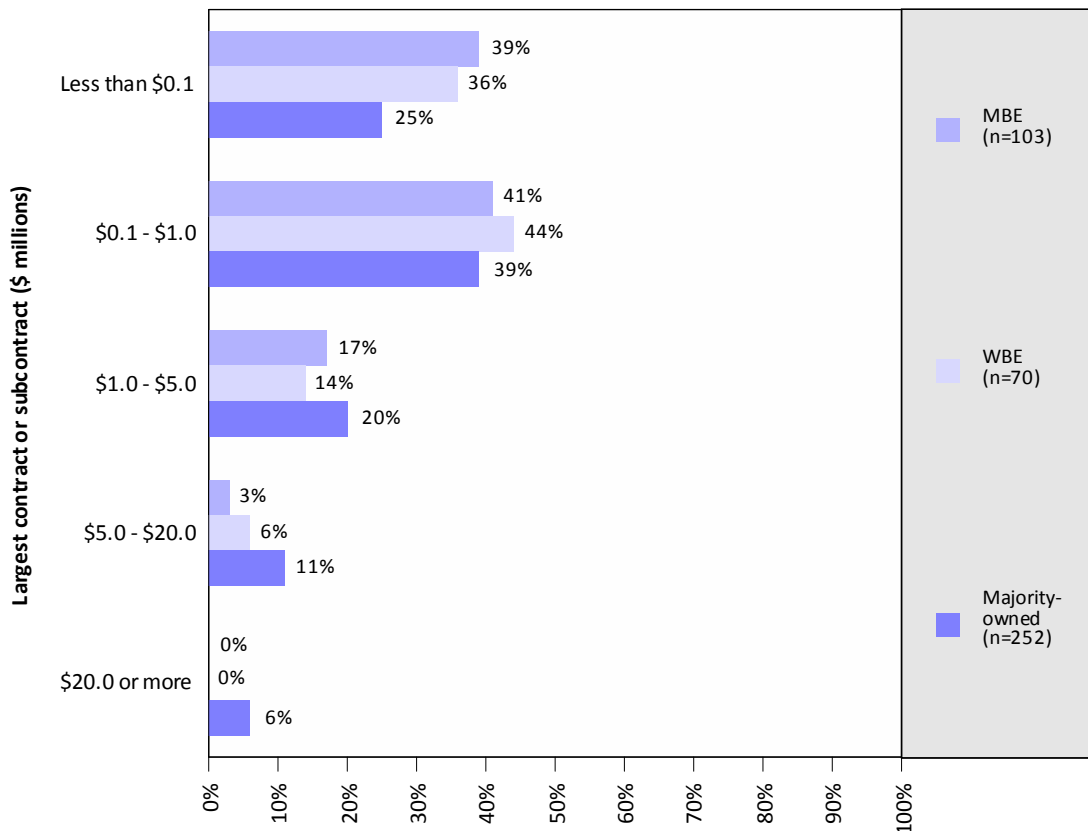
Availability interview results also indicate that firms working as prime contractors often also function as subcontractors (and vice versa). In-depth interviews with business owners confirmed that result.

Largest contract in Arizona in the past seven years. As part of the availability interviews, the study team asked businesses to identify the largest road and highway, transit or aviation-related contract or subcontract they were awarded in Arizona in the past seven years.

Construction. Figure H-5 examines transportation construction firms' responses to the question concerning the largest contract they had been awarded. Most MBE and WBE construction companies indicated that the largest contracts or subcontracts they had been awarded were less than \$100,000 or from \$100,000 to \$1 million. For example, 39 percent of MBE construction firms reported that their largest contract was less than \$100,000. None of the MBEs and WBEs interviewed indicated that they had received a contract of \$20 million or more in Arizona in the past seven years.

Combining the three largest size categories of contracts starting at \$1 million (\$1-5 million, \$5-20 million and \$20 million+), relatively fewer women- and minority-owned construction companies (20%) reported that the largest contract they received was worth \$1 million or more compared with majority-owned firms (37%).

Figure H-5.
Largest road and highway, transit or aviation-related contract or subcontract that businesses received in Arizona in the past seven years, construction



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms. Total may not add to 100 due to rounding.

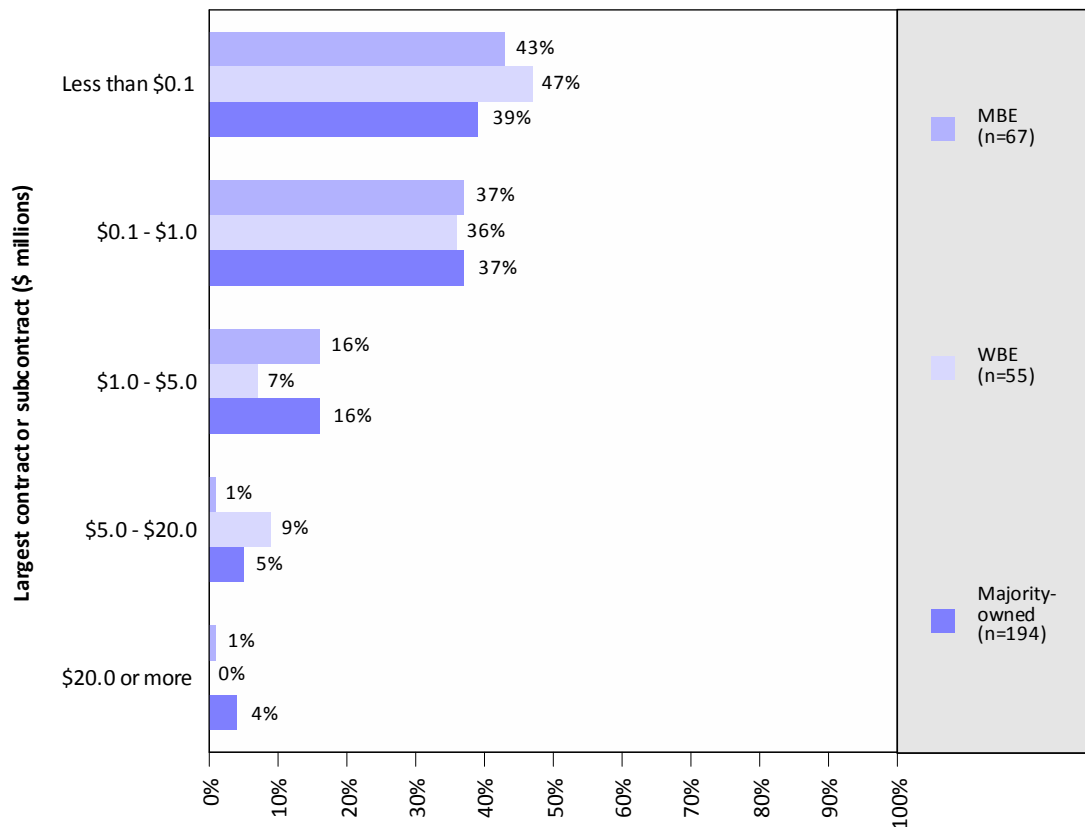
Source: Keen Independent Research from 2014 Availability Interviews.

Engineering. Figure H-6 analyzes the largest contracts that majority-, minority- and women-owned engineering-related businesses were awarded in the past seven years based on availability interview responses.

For most engineering businesses, the largest contract received was less than \$1 million. Combining the largest three categories of contracts starting at \$1 million, about 18 percent of MBEs and 16 percent of WBEs reported that the largest contract they had been awarded in the past seven years was worth \$1 million or more compared with 25 percent of majority-owned businesses.

Figure H-6.

Largest road and highway, transit or aviation-related contract or subcontract that businesses received in Arizona in the past seven years, engineering



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Total may not add to 100 due to rounding.

Source: Keen Independent Research from 2014 Availability Interviews.

Relative Bid Capacity

Some legal cases regarding race- and gender-conscious contracting programs have considered the importance of the “relative capacity” of businesses included in an availability analysis.⁴ One approach to account for differing capacities among different types of businesses is to examine relatively small contracts, a technique noted in *Rothe Development Corp. v. U.S. Department of Defense*. In addition to examining size of contracts, Keen Independent directly measured bid capacity in its availability analysis.⁵

Through this analysis, Keen Independent was able to distinguish firms based on the largest contracts or subcontracts they had performed or bid on (i.e., “bid capacity” as used in this study). Although additional measures of capacity might be theoretically possible, the bid capacity concept can be articulated and quantified for individual firms for specific time periods.

Measurement of bid capacity. The availability analysis produced a database of more than 1,000 businesses potentially available for ADOT work. “Relative capacity” for a business is measured as the largest contract or subcontract that the business performed or reported that they had bid on within the seven years preceding when Keen Independent interviewed it.

Subindustries such as paving and general road construction tend to involve relatively large projects. Other subindustries, such as surveying, typically involve smaller projects. Figure H-7 reports the median relative bid capacity among Arizona transportation-related businesses in 27 subindustries. Results categorized companies according to their primary line of business (e.g., results for a firm that primarily performs excavation that also does trucking and hauling are included under excavation, grading and drainage).⁶

⁴ For example, see the decision of the United States Court of appeals for the Federal Circuit in *Rothe Development Corp. v. U.S. Department of Defense*, 545 F.3d 1023 (Fed. Cir. 2008).

⁵ See Appendix D for details about the availability interview process.

⁶ Only subindustries with a minimum of three respondents in the availability interviews were analyzed.

Figure H-7.
Median relative capacity by subindustry

Subindustry	Median bid capacity
Construction	
General road construction and widening	\$5 million to \$10 million
Portland cement concrete paving	\$2 million to \$5 million
Erosion control	\$2 million to \$5 million
Asphalt paving	\$1 million to \$2 million
Asphalt and concrete paving supply	\$1 million to \$2 million
Excavation, grading and drainage	\$1 million
Aggregate materials supply	\$500,000 to \$1 million
Structural concrete work	\$500,000 to \$1 million
Wrecking and demolition	\$500,000 to \$1 million
Steel work	\$500,000 to \$1 million
Concrete flatwork	\$100,000 to \$500,000
Concrete pumping	\$100,000 to \$500,000
Drilling and foundations	\$100,000 to \$500,000
Electrical work including lighting and signals	\$100,000 to \$500,000
Guardrail, signs or fencing	\$100,000 to \$500,000
Landscaping and related work	\$100,000 to \$500,000
Pavement surface treatment	\$100,000 to \$500,000
Striping or pavement parking	\$100,000 to \$500,000
Trucking and hauling	\$100,000 to \$500,000
Underground utilities	\$100,000 to \$500,000
Concrete cutting	\$100,000 or less
Engineering-related	
Construction management	\$2 million to \$5 million
Design engineering	\$100,000 to \$500,000
Soils and materials testing	\$100,000 to \$500,000
Surveying and mapping	\$100,000 to \$500,000
Transportation planning	\$100,000
Environmental consulting	\$100,000 or less

Source: Keen Independent Research from 2014 Availability Interviews.

Comparison of MBE/WBE and majority-owned bid capacity for transportation construction.

Keen Independent examined whether there were difference in the size of the largest contracts for MBEs, WBEs and majority-owned firms within the same subindustries.

- First, the study team determined for each company whether its largest contract or subcontract (awarded or bid on) was higher than the median for its primary line of business. For example, if the median bid capacity category for a subindustry was \$1-2 million, and a firm's largest contract was more than \$2 million, it was classified as having "above median bid capacity."

- Keen Independent then calculated the percentage of MBEs, WBEs and majority-owned firms that had above-median bid capacity for their subindustry. Figure H-8 reports results for construction subindustries and engineering-related subindustries.

For about one-in-three MBE construction businesses, the largest contract bid on or awarded was higher than the median for its subindustry. (This also means that for two-thirds of MBE construction businesses, the largest contract was in the same or lower size category as the median for their primary line of business or was lower.)

Relatively more majority-owned construction businesses (42%) reported largest contracts that were above the median for their subindustry.

Only 24 percent of WBEs reported largest contracts that were above the median for their subindustry.

Figure H-8.
Proportion of firms with above-median bid capacity by ownership

Source:
Keen Independent Research from 2014
Availability Interviews.

Firm	Construction	Engineering
MBE	33 %	32 %
WBE	24	36
Majority-owned	42	41

Engineering. Figure H-8 also shows the percentage of engineering businesses that reported relative capacities that exceeded the median for their subindustries.

- For 32 percent of MBE engineering businesses, the largest contract bid on or received was higher than the median size category for their subindustry.
- 36 percent of WBEs had above-median bid capacity.
- 41 percent of majority-owned engineering businesses had above-median bid capacity.

Further analysis. The study team considered whether race- and gender-neutral factors could account for the disparities in bid capacity identified for MBEs and WBEs in construction and engineering. There were several variables from the availability interviews that may be related to relative bid capacity, such as annual revenue, number of employees and whether a business has multiple establishments in Arizona.

After considering business characteristics from the availability interviews, Keen Independent determined that age of business was the race- and gender-neutral factor that might best explain differences in relative capacity within a subindustry while also being external to capacity measures. Theoretically, the longer that companies are in business, the larger the contracts or subcontracts that they might pursue.

To test that hypothesis, the study team developed a logistic regression model to determine whether relative bid capacity could be at least partly explained by the age of businesses. The regression results are shown in Figure H-9. The analysis indicated the following:

- Business age was a statistically significant predictor of having above-median bid capacity. The older a business, the more likely it was to show above-median bid capacity;
- Minority ownership had a negative, though not significant, relationship to bid capacity after controlling for subindustry and age of firm; and
- Female ownership was negatively related to having above-median capacity. That effect was statistically significant at the 95 percent confidence level.

The regression model indicates that age of the business can account for the differences in bid capacity between MBEs and majority-owned firms in the same subindustries. There is indication from the regression analysis that white women-owned firms had lower bid capacity after controlling for primarily line of business and company age.

Figure H-9.
Arizona transportation contracting
industry bid capacity regression model

Note:

*, ** Denote statistical significance at the 90% or 95% confidence level, respectively.

Source:

Keen Independent Research from 2014 Availability Interviews.

Variable	Coefficient	Chi-square statistic
Age of firm	0.03	39.04 **
Minority	-0.08	0.26
Female	-0.36	3.82 **

Summary of markets, contracting roles and bid capacity. Availability interview results show that most firms in the transportation contracting industry pursue both public and private sector work, although MBEs and WBEs are somewhat less likely to bid on or be awarded public sector contracts compared with majority-owned firms. About one-half of minority- and women-owned firms report pursuing work as a prime contractor, less than the 64 percent of majority-owned firms that have bid on or been awarded prime contracts. Compared with majority-owned companies, relatively few MBEs or WBEs have been awarded contracts or subcontracts of \$1 million or more in size.

Analysis of bid capacity indicated that the largest contracts or subcontracts MBEs and WBEs have bid on or been awarded was lower than majority-owned firms in the same subindustries. The fact that majority-owned firms tend to be older than MBEs and WBEs explains most of these differences.

Business Closures, Expansions, and Contractions

A 2010 SBA report investigated business dynamics for the 2002 through 2006 time period for minority-owned and white-owned businesses. By matching data from business owners who responded to the 2002 U.S. Census Bureau Survey of Business Owners (SBO) to data from the Census Bureau's 1989-2006 Business Information Tracking Series, the SBA reported on business

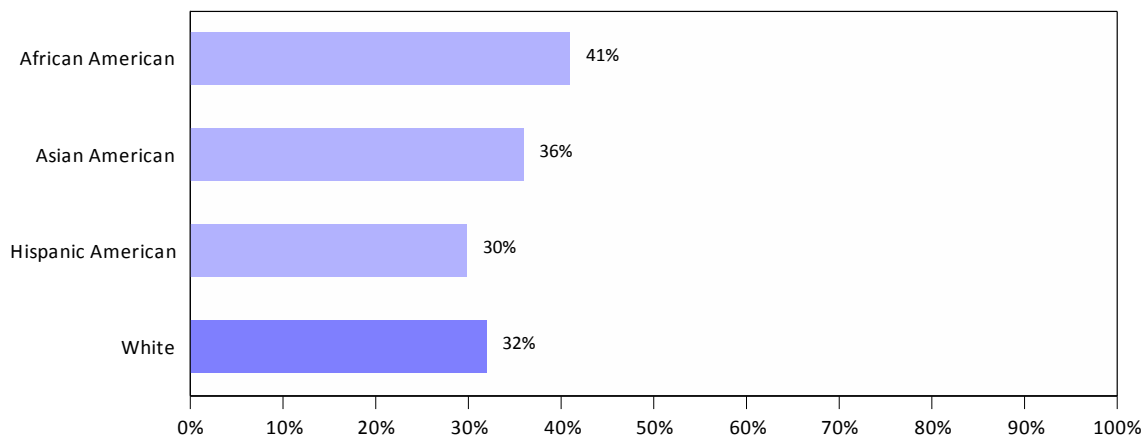
closures, expansions and contractions between 2002 and 2006 across different sectors of the economy.^{7,8} The SBA examined differences in outcomes by race and ethnicity, but not gender.

Business closures. High rates of business closures may reflect adverse business conditions for minority business owners.

Overall rates of business closures in Arizona. The 2010 SBA report analyzed business closure rates between 2002 and 2006 for minority- and white-owned firms in Arizona. Figure H-10 presents those data for African American-, Asian American- and Hispanic American-owned businesses as well as for white-owned businesses.

- About 41 percent of African American-owned businesses that were operating in Arizona in 2002 had closed by the end of 2006, a higher rate than for white-owned businesses (32%).
- Asian American-owned businesses also had closure rates higher than white-owned businesses.
- Closure rates for Hispanic American-owned businesses (30%) were similar to white-owned firms.

Figure H-10.
Rates of business closure in Arizona, 2002 through 2006



Note: Data refer to non-publicly-held businesses. As sample sizes are not reported, statistical significance of these results cannot be determined; however, statistics are consistent with SBA data quality guidelines.

Source: Lowrey, Ying. 2010. "Race/Ethnicity and Establishment Dynamics, 2002-2006." U.S. Small Business Administration Office of Advocacy. Washington D.C.

Rates of business closures by industry. Data for the construction and professional services industries were not available by state. The SBA analysis only reported industry-specific results for the nation as a whole. Based on national results, 43 percent of African American-owned construction businesses that were operating in 2002 had closed by 2006, higher than the rate for white-owned

⁷ Lowrey, Ying. 2010. "Race/Ethnicity and Establishment Dynamics, 2002-2006." U.S. Small Business Administration Office of Advocacy. Washington D.C.

⁸ Businesses classifiable by race/ethnicity exclude publicly-traded companies. Keen Independent did not categorize racial groups by ethnicity. As a result, some Hispanic Americans may also be included in statistics for African Americans, Asian Americans and whites.

construction companies. Among professional, scientific, and technical services firms, relatively more African American-owned businesses closed than white-owned firms.

Hispanic American-owned businesses and Asian American-owned construction businesses that were operating in 2002 were also more likely than white-owned companies to have closed by 2006. This was also found the professional, scientific, and technical services industry.

Unsuccessful closures. Not all business closures can be interpreted as “unsuccessful closures.” Businesses may close when an owner retires or a more profitable business opportunity emerges, both of which represent “successful closures.” The 1992 Characteristics of Business Owners (CBO) Survey is one of the few Census Bureau sources to classify business closures into successful and unsuccessful subsets.⁹ The 1992 CBO combines data from the 1992 Economic Census and a survey of business owners conducted in 1996. The survey portion of the 1992 CBO asked owners of businesses that had closed between 1992 and 1995, “Which item below describes the status of this business at the time the decision was made to cease operations?” Only the responses “successful” and “unsuccessful” were permitted. A firm that reported being unsuccessful at the time of closure was understood to have failed.

Keen Independent examined CBO data on the proportion of businesses that closed due to failure between 1992 and 1995 in construction; professional, scientific, and technical services; and all industries.^{10, 11} According to CBO data, African American-owned businesses were the most likely to report being “unsuccessful” at the time their businesses closed. About 77 percent of African American-owned businesses in all industries reported an unsuccessful business closure between 1992 and 1995, compared with only 61 percent of non-Hispanic white male-owned businesses. Unsuccessful closure rates were also relatively high for Hispanic American-owned businesses (71%) and for businesses owned by “other minority groups” (73%). The rate of unsuccessful closures for women-owned businesses (61%) was similar to that of non-Hispanic white male-owned businesses.

In the construction industry, minority- and women-owned businesses were more likely to report unsuccessful business closures than non-Hispanic white male-owned businesses (58%). Those trends were similar in the professional services industry with one exception — women-owned businesses (52%) were less likely to report unsuccessful closures than non-Hispanic white male-owned businesses (59%).

⁹ CBO data from the 1997 and 2002 Economic Censuses do not include statistics on successful and unsuccessful business closures. To date, the 1992 CBO is the only U.S. Census dataset that includes such statistics.

¹⁰ All CBO data should be interpreted with caution as businesses that did not respond to the survey cannot be assumed to have the same characteristics of ones that did. Holmes, Thomas J. and James Schmitz. 1996. “Nonresponse Bias and Business Turnover Rates: The Case of the Characteristics of Business Owners Survey.” *Journal of Business & Economic Statistics*. 14(2): 231-241. This report did not include CBO data on overall business closure rates because businesses not responding to the survey were found to be much more likely to have closed than ones that did.

¹¹ This study includes CBO data on firm success because there is no compelling reason to believe that closed businesses responding to the survey would have reported different rates of success/failure than those closed businesses that did not respond to the survey. Headd, Brian. U.S. Small Business Administration, Office of Advocacy. 2000. *Business Success: Factors leading to surviving and closing successfully*. Washington D.C.: 12.

Reasons for differences in unsuccessful closure rates. Several researchers have offered explanations for higher rates of unsuccessful closures among minority- and women-owned businesses compared with non-Hispanic white-owned businesses:

- Unsuccessful business failures of minority-owned businesses are largely due to barriers in access to capital.¹² Regression analyses have identified initial capitalization as a significant factor in determining firm viability. Because minority-owned businesses secure smaller amounts of debt equity in the form of loans, they may be more liable to fail. Difficulty in accessing capital is found to be particularly acute for minority-owned businesses in the construction industry.¹³
- Prior work experience in a family member's business or similar experiences are found to be strong determinants of business viability. Because minority business owners are much less likely to have such experience, their businesses are less likely to survive.¹⁴ Similar research has been conducted for women-owned businesses and found similar gender-based gaps in the likelihood of business survival.¹⁵
- Level of education is found to be a strong determinant of business survival. Educational attainment explains a substantial portion of the gap in business closure rates between African American-owned and non-minority-owned businesses.¹⁶
- Non-minority business owners have broader business opportunities, increasing their likelihood of closing successful businesses to pursue more profitable business alternatives. Minority business owners, especially those who do not speak English, have limited employment options and are less likely to close a successful business.¹⁷
- Possession of greater initial capital and generally higher levels of education among Asian Americans are related to the relatively high rate of survival of Asian American-owned businesses compared to other minority-owned businesses.¹⁸

Expansions and contractions. Comparing rates of expansion and contraction between minority-owned and white-owned businesses is also useful in assessing the success of minority-owned businesses. As with closure data, only some of the data on expansions and contractions that were available for the nation were also available at the state level.

¹² Access to capital is discussed in greater detail in Appendix G.

¹³ Bates, Timothy and Caren Grown. 1991. "Commercial Lending Practices and the Development of Black-Owned Construction Companies." Center for Economic Studies, U.S. Census Bureau.

¹⁴ Robb, A. and Fairlie, R. 2005. "Why are Black-Owned Businesses Less Successful than White-Owned Businesses? The Role of Families, Inheritances, and Business Human Capital." University of California, Santa Cruz.

¹⁵ Fairlie, R. and A. Robb. 2009. "Gender Differences in Business Performance: Evidence from the Characteristics of Business Owners Survey." University of California, Santa Cruz.

¹⁶ Ibid.

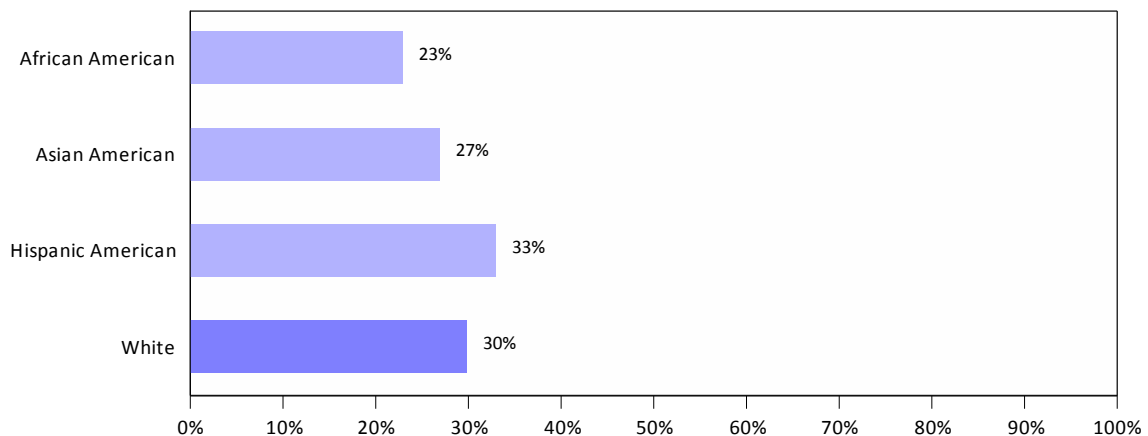
¹⁷ Bates, Timothy. 2002. "Analysis of Young Small Businesses That Have Closed: Delineating Successful from Unsuccessful Closures." Center for Economic Studies, U.S. Census Bureau.

¹⁸ Bates, Timothy. 1993. "Determinants of Survival and Profitability Among Asian Immigrant-Owned Small Businesses." Center for Economic Studies, U.S. Census Bureau.

Expansions. The 2010 SBA study of minority business dynamics from 2002 through 2006 examined the number of non-publicly-held Arizona businesses that expanded and contracted between 2002 and 2006. Figure H-11 presents the percentage of all Arizona businesses, by race/ethnicity of ownership, that increased their total employment between 2002 and 2006.

Results for Arizona from the SBA study indicate that a smaller percentage of African American-owned businesses (23%) expanded between 2002 and 2006 compared with white-owned businesses (30%). Relatively fewer Asian American-owned businesses expanded (27%) compared to white-owned businesses. One-third of Hispanic-owned businesses reported expansion, somewhat higher than the results for white-owned businesses.¹⁹

Figure H-11.
Percentage of businesses in Arizona that expanded, 2002 through 2006



Note: Data refer to non-publicly-held businesses. As sample sizes are not reported, statistical significance of these results cannot be determined; however, statistics are consistent with SBA data quality guidelines.

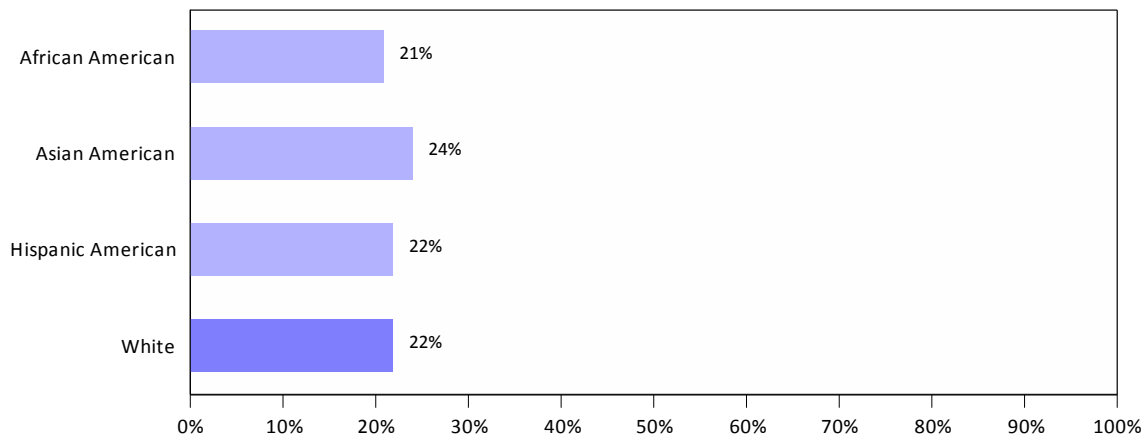
Source: Lowrey, Ying. 2010. "Race/Ethnicity and Establishment Dynamics, 2002-2006." U.S. Small Business Administration Office of Advocacy. Washington D.C.

The 2010 SBA study did not report state-level results for individual industries. For the nation, African American-owned construction and professional, scientific, and technical services businesses were less likely than white-owned businesses to have expanded between 2002 and 2006. Hispanic American- and Asian American-owned companies in both construction and professional, scientific, and technical services were slightly more likely than white-owned businesses to have expanded between 2002 and 2006.

¹⁹ Lowrey, Ying. 2010. "Race/Ethnicity and Establishment Dynamics, 2002-2006." U.S. Small Business Administration Office of Advocacy. Washington D.C.

Contractions. Figure H-12 shows the percentage of businesses operating in 2002 that reduced their employment (i.e., contracted) between 2002 and 2006 in Arizona. About 22 percent of white-owned firms contracted employment during this period. Results were similar for minority-owned firms.

Figure H-12.
Percentage of businesses in Arizona that contracted, 2002 through 2006



Note: Data refer to non-publicly-held businesses. As sample sizes are not reported, statistical significance of these results cannot be determined; however, statistics are consistent with SBA data quality guidelines.

Source: Lowrey, Ying. 2010. "Race/Ethnicity and Establishment Dynamics, 2002-2006." U.S. Small Business Administration Office of Advocacy. Washington D.C.

The SBA study did not report state-specific results relating to contractions in individual industries. Based on national data, a slightly smaller percentage of African American-, Hispanic American- and Asian American-owned construction and professional, scientific, and technical services businesses contracted between 2002 and 2006 compared to white-owned businesses.

Summary of business closure, expansion and contraction. The following conclusions can be made based on U.S. Small Business Administration analyses for 2002 to 2006 for Arizona:

- African American-owned businesses were more likely than white-owned businesses to close. African American-owned businesses were also less likely to expand than white-owned businesses.
- Asian American-owned businesses were more likely to close, less likely to expand and more likely to contract than white-owned businesses.
- Closure, expansion and contraction rates for Hispanic American-owned businesses were similar to white-owned firms for those years.

Business Receipts and Earnings

Annual business receipts and earnings for business owners are also indicators of the success of businesses. Keen Independent used several different data sources, including:

- Business receipts data from the U.S. Census Bureau 2007 Survey of Business Owners;
- Business earnings data for business owners from the 2000 Census and 2008-2012 American Community Survey (ACS); and
- Annual revenue data for Arizona transportation construction and engineering businesses that the study team collected as part of availability interviews.

Business receipts. Keen Independent examined receipts for construction and professional, scientific and technical services businesses in Arizona using data from the 2007 Survey of Business Owners (SBO), conducted by the U.S. Census Bureau. The 2007 SBO reports business receipts separately for “employer” firms (i.e., those with paid employees other than the business owner and family members) and for all businesses.²⁰

Figure H-13 presents mean annual receipts in 2007 (in thousands of dollars) for construction and for professional, scientific, and technical services businesses. The first column of results for “all firms” pertains to construction businesses, including employer firms and non-employer businesses. The second column presents results for professional, scientific and technical services firms in Arizona, including both employers and non-employers. The final two columns provide mean receipts for employer firms (companies with paid employees).

Figure H-13.

Mean annual receipts (thousands) for businesses in the construction and professional, scientific and technical services industries, by race/ethnicity and gender of owners, Arizona, 2007

	All firms		Employer firms	
	Construction	Professional, scientific and technical services	Construction	Professional, scientific and technical services
African American	\$59	\$79	\$401	\$332
Asian American	\$286	\$167	\$1,155	\$937
Hispanic American	\$299	\$94	\$1,372	\$493
American Indian and Alaska Native	\$225	\$45	\$1,362	\$353
Non-Hispanic white	\$903	\$181	\$2,578	\$705
Female	\$578	\$85	\$1,648	\$400
Male	\$919	\$235	\$3,163	\$895

Notes: Does not include publicly-traded companies or other businesses not classifiable by race/ethnicity and gender. As sample sizes are not reported, statistical significance of these results cannot be determined.

Source: 2007 Survey of Business Owners, part of the U.S. Census Bureau’s 2007 Economic Census.

²⁰ The data include incorporated and unincorporated businesses, but not publicly-traded companies or other businesses not classifiable by race/ethnicity and gender.

Construction. In the Arizona construction industry, average 2007 receipts for minority-owned businesses were lower than the average for non-Hispanic white-owned businesses (\$900,000). Results for all businesses (i.e., employer and non-employer businesses combined) indicate that:

- Average receipts of African American-owned construction businesses (\$59,000) were only 7 percent that of non-Hispanic white-owned Arizona construction businesses (\$903,000);
- Average receipts of Asian American-owned construction businesses (\$286,000) were about one-third that of non-Hispanic white-owned construction businesses in Arizona;
- Hispanic-owned construction businesses (\$299,000) had average revenue that was also about one-third of the average for non-Hispanic white-owned businesses;
- Average receipts of American Indian and Alaska Native-owned construction businesses (\$225,000) were about one-fourth that of non-Hispanic white-owned construction businesses; and
- Average receipts for women-owned construction businesses in Arizona (\$578,000) were 63 percent of the average for male-owned businesses (\$919,000).

Average receipts were higher for businesses with paid employees (the third and fourth columns of results in Figure H-13). Non-Hispanic white-owned construction employer businesses had average receipts of \$2.6 million. Minority-owned construction firms with paid employees had lower receipts:

- Average receipts of African American-owned construction employer businesses (\$401,000) were only 16 percent that of non-Hispanic white-owned Arizona construction employer businesses (\$2,578,000);
- Average receipts of Asian American-owned construction employer businesses (\$1.2 million) were about 45 percent that of non-Hispanic white-owned construction employer businesses in Arizona; and
- Hispanic- and American Indian and Alaska Native-owned construction employer businesses (\$1.4 million each) exhibited revenues that were 53 percent of the average of non-Hispanic white-owned employer businesses.
- Average receipts for women-owned construction employer businesses (\$1.6 million) were one-half the average of male-owned employer businesses (\$3.2 million).

Professional, scientific, and technical services. In the Arizona professional, scientific, and technical services industry, African American-, Asian American-, and Hispanic-owned businesses had lower average receipts than non-Hispanic white-owned businesses.

Results for all businesses (i.e., employer and non-employer businesses combined) in the professional, scientific, and technical services industry indicate that:

- Average receipts of African American-owned businesses (\$79,000) were 44 percent that of non-Hispanic white-owned businesses (\$181,000);
- Average receipts of Asian American-owned businesses (\$167,000) were 92 percent of non-Hispanic white-owned businesses;
- Average receipts of Hispanic American-owned companies (\$94,000) were 52 percent that of non-Hispanic white-owned businesses; and
- Average receipts of American Indian and Alaska Native-owned businesses (\$45,000) were only one-fourth the average receipts of non-Hispanic white-owned businesses.
- Average receipts of women-owned businesses in the Arizona professional, scientific, and technical services industry (\$85,000) were 36 percent that of male-owned businesses (\$235,000).

Examination of businesses with paid employees in professional, scientific, and technical services showed similar results, with the exception of Asian American-owned employer businesses. Average receipts of Asian American-owned employer businesses (\$937,000) exceeded those of non-Hispanic white-owned employer businesses (\$705,000) in this industry.

Business earnings. Keen Independent also examined U.S. Census data regarding earnings of business owners in Arizona. Data sources were the Public Use Microdata Series (PUMS) data from the 2000 U.S. Census of Population and the 2008-2012 American Community Survey (ACS). Keen Independent analyzed earnings of incorporated and unincorporated business owners age 16 and older who reported positive business earnings. Results are presented for the Arizona construction industry and the Arizona engineering industry.

Construction business owner earnings, 1999. The 2000 Census of Population asked business owners about their business earnings in the previous year (1999). Figure H-14 shows average earnings in that year for business owners in the construction industry in Arizona. Due to small sample sizes for individual racial/ethnic groups, Keen Independent examined Hispanic Americans separately but grouped all other minorities into a single “other minority” category.

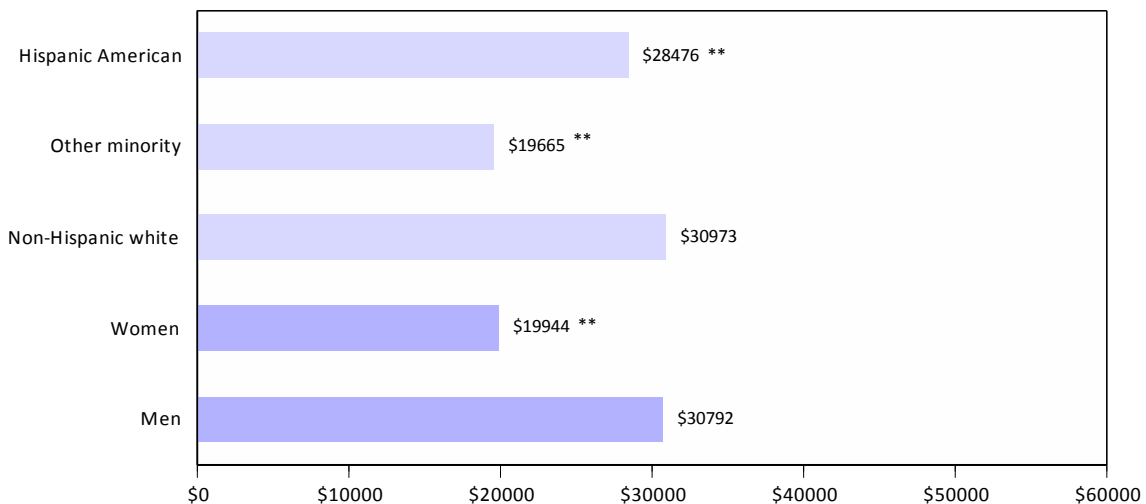
The top three bars of Figure H-14 present results for Hispanic Americans, other minorities and non-Hispanic whites. Results indicated that:

- On average, Hispanic American construction business owners in Arizona earned less (\$28,476) than non-Hispanic white construction business owners (\$30,973). This difference was statistically significant at the 95 percent confidence level.
- Other minority business owners earned significantly less (\$19,665) than non-Hispanic white business owners and that difference was also statistically significant at the 95 percent confidence level.

The bottom two bars of Figure H-14 compare business owner earnings for women and men who owned construction businesses in Arizona. With mean earnings of \$19,944, female construction business owners in Arizona earned considerably less than male construction business owners (\$30,792). This difference was statistically significant at the 95 percent confidence level.

Figure H-14.

Mean annual business owner earnings in the construction industry in Arizona, 1999



Note: The sample universe is business owners age 16 and over who reported positive earnings. All amounts in 1999 dollars. *,** Denote statistically significant differences from non-Hispanic whites (for minority groups) or from men (for women) at the 90% and 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

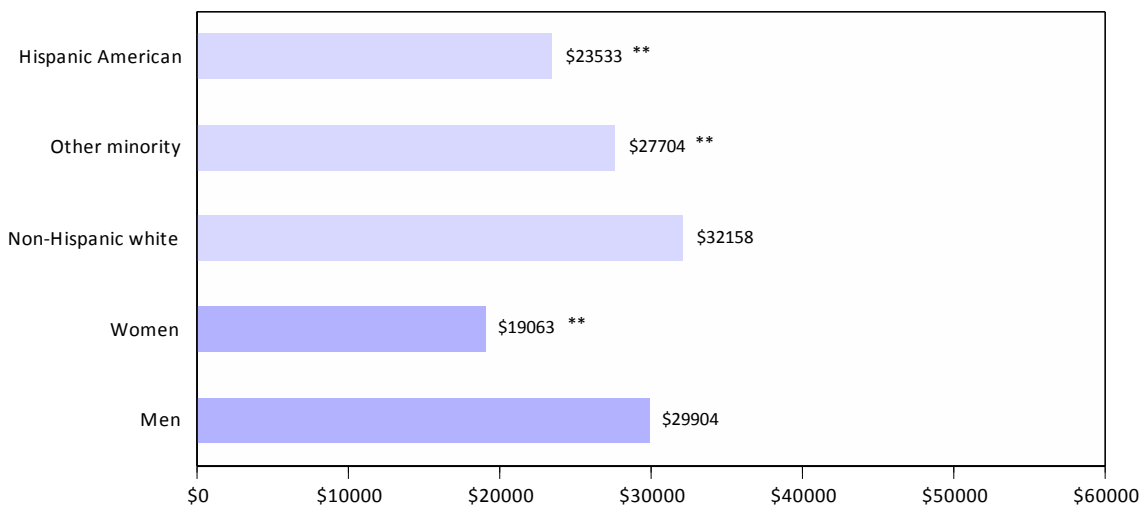
Construction business owner earnings, 2007-2012. The 2008-2012 ACS also reports business owner earnings. Because of the way that the U.S. Census Bureau conducts each year's ACS, earnings for business owners reported in the 2008 through 2012 sample were for the previous 12 months (2007-2012).²¹ All dollar amounts are presented in 2012 dollars.

²¹ For example, if a business owner completed the survey on January 1, 2009, the figures for the previous 12 months would reference January 1, 2008 to December 31, 2008. Similarly, a business owner completing the survey December 31, 2011 would reference amounts since January 1, 2011.

Figure H-15 shows earnings in 2007 through 2012 for business owners in the construction industry in Arizona. Again, due to small sample sizes for non-Hispanic minority groups, these groups were combined.

- On average, Hispanic American construction business owners in Arizona earned less in 2007-2012 (\$23,533) than non-Hispanic white construction business owners (\$32,158), a statistically significant difference at the 95 percent confidence level.
- Other minority-owned construction business owners also earned less (\$27,704) than non-Hispanic white construction business owners. This difference was significant at the 95 percent confidence level.
- Female construction business owners in Arizona earned substantially less, on average (\$19,063), than male construction business owners (\$29,904), a statistically significant difference at the 95 percent confidence level.

Figure H-15.
Mean annual business owner earnings in the construction industry in Arizona, 2007 through 2012



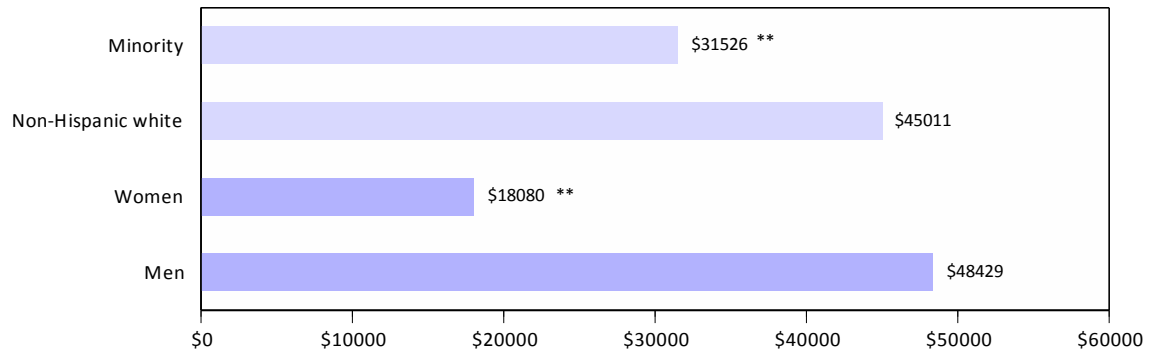
Note: The sample universe is business owners age 16 and over who reported positive earnings. All amounts in 2012 dollars. *, ** Denote statistically significant differences from non-Hispanic whites (for minority groups) or from men (for women) at the 90% and 95% confidence level, respectively.

Source: Keen Independent Research from 2008-2012 ACS. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Engineering business owner earnings, 1999. Figure H-16 presents average earnings in 1999 for business owners in the engineering industry in Arizona based on the 2000 Census. Due to small sample sizes for individual groups, Keen Independent analyzed results for minority business owners combined.

- Minority engineering business owners in Arizona earned considerably less (\$31,526) than non-Hispanic whites in 1999 (\$45,011), a statistically significant difference.
- Female engineering business owners in Arizona also earned substantially less (\$18,080) than male business owners (\$48,429) in 1999 (statistically significant difference).

Figure H-16.
Mean annual business owner earnings in the engineering industry in Arizona, 1999



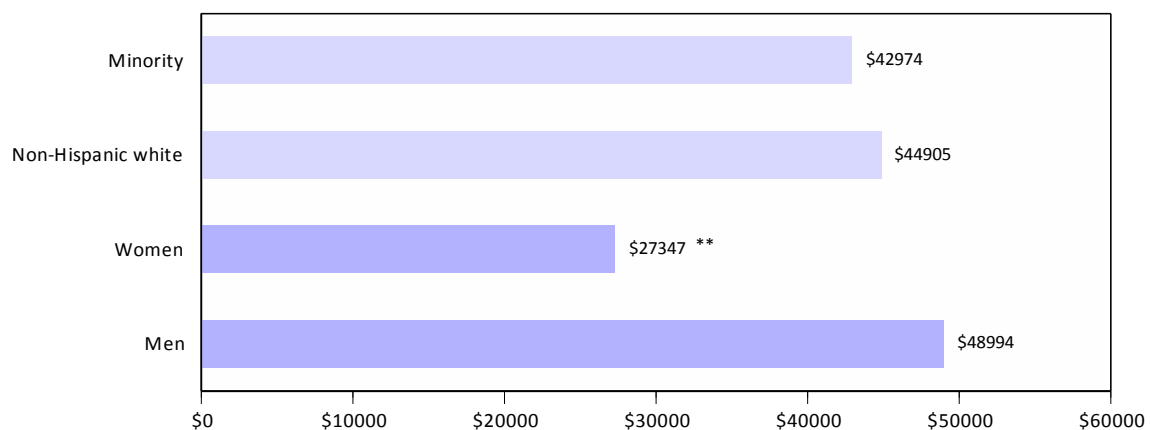
Note: The sample universe is business owners age 16 and over who reported positive earnings. All amounts in 1999 dollars.
*,** Denote statistically significant differences from non-Hispanic whites (for minority groups) or from men (for women) at the 90% and 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Engineering business owner earnings, 2007-2012. As with earnings data for the construction industry, earnings for engineering business owners that were reported in the 2008-2012 ACS data were for the time period between 2007 and 2012. Again, due to small sample sizes, all minority business owners were combined into a single category. Results are for Arizona. Those results are displayed in Figure H-17.

- Minority business owners earned \$42,974, on average, which is about the same as non-minority business owners (about \$44,905) in Arizona.
- Average earnings for female engineering business owners (about \$27,347) were substantially lower than for male business owners (\$48,994) in Arizona, a statistically significant difference.

Figure H-17.
Mean annual business owner earnings in the engineering industry in Arizona, 2007 through 2012



Note: The sample universe is business owners age 16 and over who reported positive earnings. All amounts in 2012 dollars.
*,** Denote statistically significant differences from non-Hispanic whites (for minority groups) or from men (for women) at the 90% and 95% confidence level, respectively.

Source: Keen Independent Research from 2008-2012 ACS. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Regression analyses of business earnings. Differences in business earnings among different racial/ethnic and gender groups may be at least partially attributable to race- and gender-neutral factors such as age, marital status, and educational attainment. Keen Independent performed regression analyses using 2008-2012 ACS data to examine whether there were differences in business earnings between minorities and non-Hispanic whites and between women and men after statistically controlling for certain race- and gender-neutral factors.

The study team applied an ordinary least squares regression model to the data that was very similar to models reviewed by courts after other disparity studies.²² The dependent variable in the model was the natural logarithm of business earnings. Business owners that reported zero or negative business earnings were excluded, as were observations for which the U.S. Census Bureau had imputed values of business earnings. Along with variables for the race, ethnicity and gender of business owners, the model also included variables for characteristics considered likely to affect earnings, including age, age-squared, marital status, ability to speak English well, disability condition, and educational attainment.

Keen Independent created two regression models for Arizona, a model for business owner earnings in 2007 through 2012 for the construction industry that included 1,258 observations and a model for business owner earnings in 2007 through 2012 for the engineering industry that included 120 observations.

²² For example, National Economic Research Associates, Inc. 2000. *Disadvantaged Business Enterprise Availability Study*. Prepared for the Minnesota Department of Transportation; and National Economic Research Associates, Inc. 2004. *Disadvantaged Business Enterprise Availability Study*. Prepared for the Illinois Department of Transportation.

Construction industry in Arizona, 2007 through 2012. Figure H-18 presents the results of the regression model for 2007 through 2012 business earnings in the Arizona construction industry. The model indicated that several race- and gender-neutral factors predicted earnings of business owners in the Arizona construction industry (and were statistically significant):

- Being older was associated with higher business earnings (with additional age having less of an effect for older individuals);
- Being married was associated with higher business earnings;
- Not being able to speak English well was associated with lower business earnings;
- Having a disability was associated with lower business earnings; and
- Having an education of less than a high school diploma was associated with lower business earnings.

After accounting for race- and gender neutral factors, results for race/ethnicity and gender were as follows:

- The model suggested that there were negative effects for minorities, but none were statistically significant; and
- Being female was associated with lower business earnings and that effect was statistically significant.

Figure H-18.
Arizona construction business owner earnings model, 2007-2012

Note:

*,** Denote statistical significance at the 90% and 95% confidence level, respectively.

Source:

Keen Independent Research from 2008-2012 ACS. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Variable	Coefficient
Constant	7.737 **
Age	0.109 **
Age-squared	-0.001 **
Married	0.305 **
Speaks English well	-0.311 **
Disabled	-0.601 *
Less than high school	-0.429 **
Some college	-0.117
Four-year degree	-0.022
Advanced degree	-0.338
Hispanic American	-0.124
Other minority	-0.235
Female	-0.574 **

Engineering industry in Arizona, 2007 through 2012. Figure H-19 presents the results of the regression model of business owner earnings in the Arizona engineering industry in 2007 through 2012. Having an advanced degree was associated with higher business earnings in the engineering industry. No other race- and gender-neutral factors were statistically significant.

After statistically controlling for race- and gender-neutral factors, Keen Independent observed that:

- Effects of race/ethnicity were not statistically significant; and
- Being female was associated with lower business earnings in the Arizona engineering industry (statistically significant).

Figure H-19.
Arizona engineering industry business owner earnings model, 2007-2012

Note:

*,** Denote statistical significance at the 90% and 95% confidence level, respectively.

Source:

Keen Independent Research from 2008-2012 ACS. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

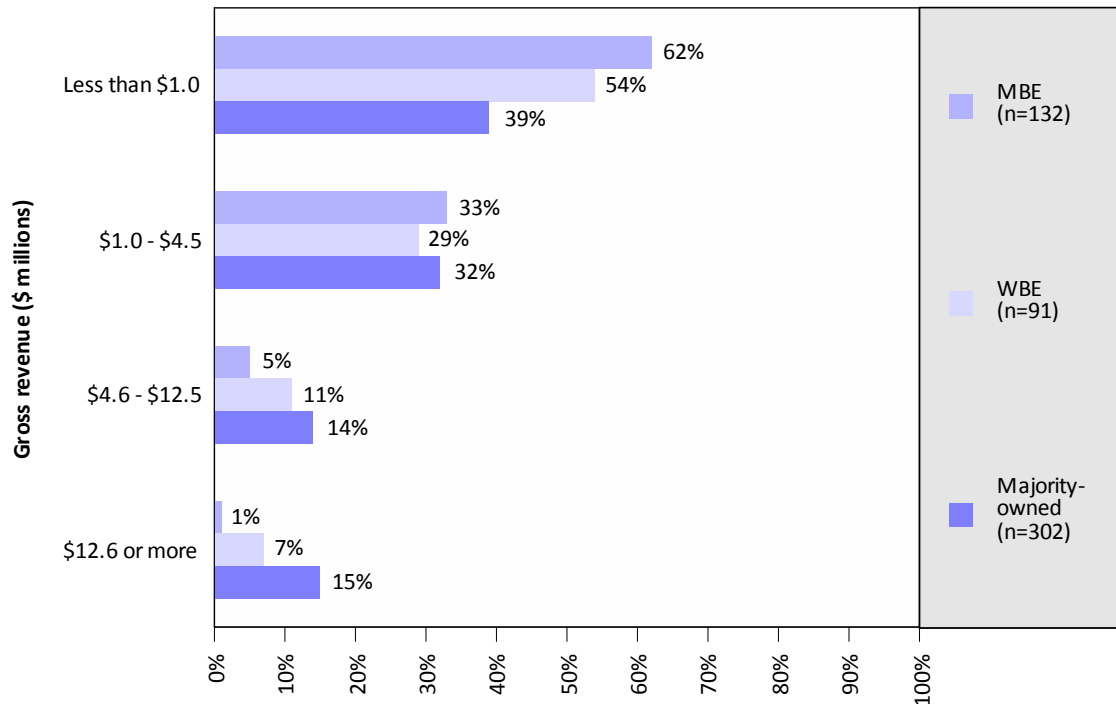
Variable	Coefficient
Constant	6.899 **
Age	0.114
Age-squared	-0.001
Married	0.430
Disabled	-0.522
Less than high school	-0.121
Some college	0.532
Four-year degree	0.398
Advanced degree	1.209 **
Hispanic American	0.190
Other minority	0.652
Female	-0.857 **

Gross revenue of construction and engineering firms from availability interviews. In the availability telephone interviews that Keen Independent conducted, firm owners and managers were asked to identify the size range of their average annual gross revenue in the previous three years.

Construction. Figure H-20 presents the reported annual revenue for MBEs, WBEs and majority-owned construction businesses.

- A larger percentage of MBEs (62%) and WBEs (54%) than majority-owned businesses (39%) reported average revenue of less than \$1 million per year.
- After combining the two highest revenue categories in Figure H-20, a relatively small proportion of MBEs and WBEs reported average revenue of \$4.6 million or more per year (6% of MBEs and 18% of WBEs) compared with majority-owned businesses (29%).

Figure H-20.
Average annual gross revenue of company over previous three years, construction industry



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

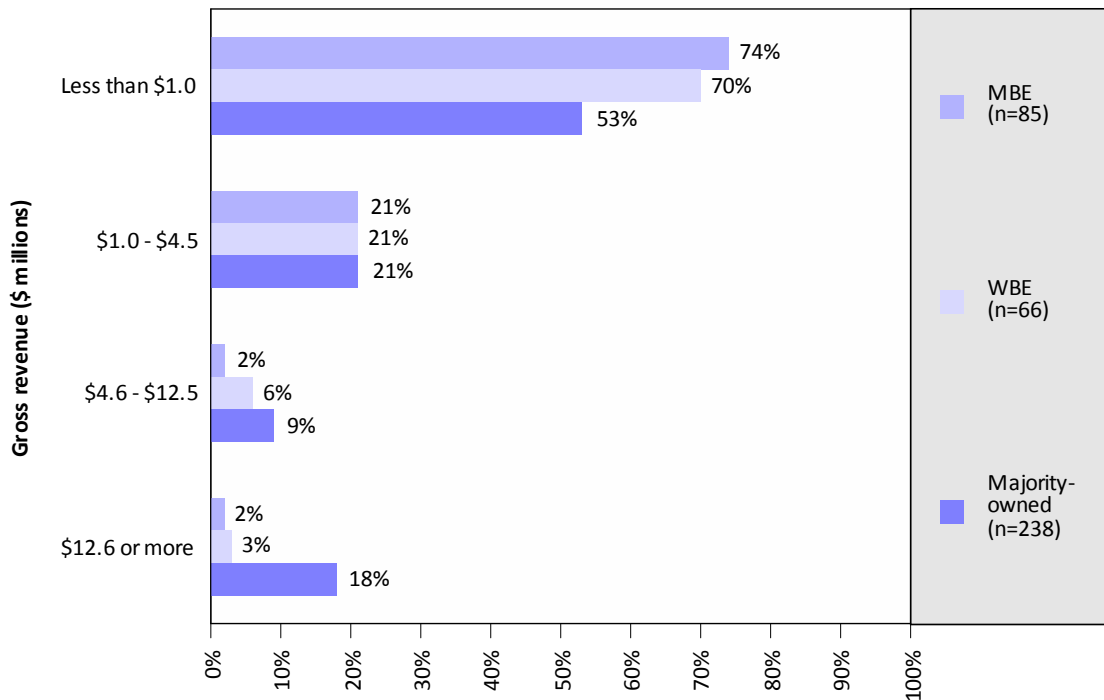
Source: Keen Independent Research from 2014 Availability Interviews.

Engineering. Engineering-related businesses were also asked to report average gross revenue over the previous three years. Figure H-21 presents those results.

- Relatively more MBEs (74%) and WBEs (70%) reported average revenue of less than \$1 million per year than majority-owned businesses (53%).
- The study team also examined the combined proportion of firms in the two highest revenue categories in Figure H-21. A substantially smaller proportion of MBEs (4%) and WBEs (9%) reported average revenue of at least \$4.6 million compared to majority-owned businesses (27%).

Figure H-21.

Annual gross revenue of company over previous three years, engineering industry



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

Summary of analysis of business receipts and earnings. Keen Independent examined business earnings data for Arizona construction and engineering-related industries from the U.S. Census Bureau and the 2014 availability interviews with Arizona businesses. The data from different data sets pertained to annual revenue in 1999, 2007-2012 and the three years before 2014. Across time periods and data sources, minority- and women-owned firms had lower revenue than majority-owned firms.

One of the data sets the study team examined included personal characteristics of the business owner. Regression analyses using these data indicated that female business owners had lower earnings than male owners after controlling for other factors.

Availability Interview Results Concerning Potential Barriers

As part of the availability interviews conducted with Arizona businesses, the study team asked firm owners and managers if they had experienced barriers or difficulties associated with starting or expanding a business or with obtaining work. Appendix D explains the interview process and provides the interview questions. Appendix G presents results for questions concerning access to capital, bonding and insurance.

Results for other interview questions are examined here, including whether the firm had experienced difficulties learning about:

- Bid opportunities with ADOT;
- Bid opportunities with local governments;
- Bid opportunities in the private sector; and
- Subcontracting opportunities in Arizona.

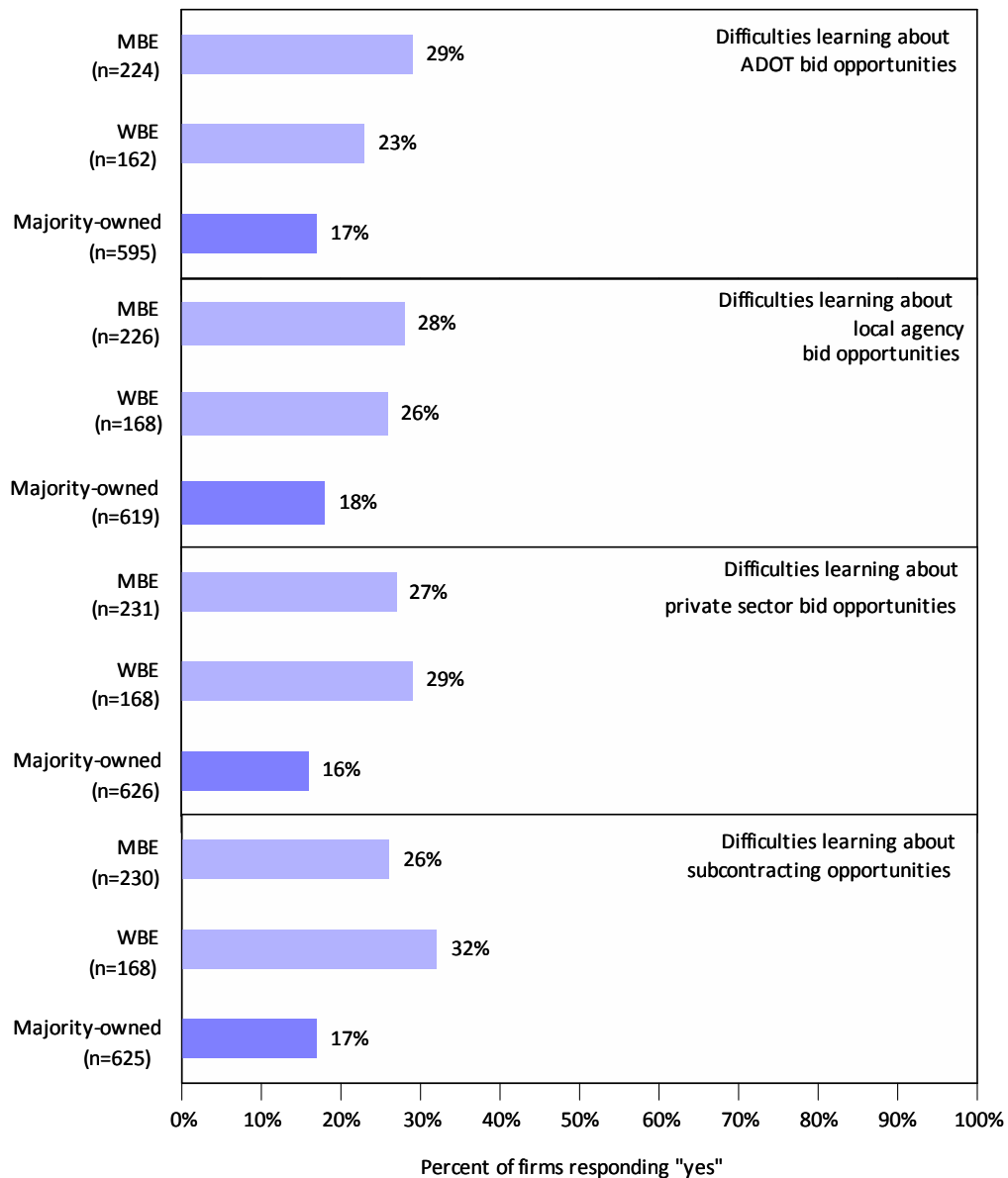
Learning about ADOT bid opportunities. As shown in Figure H-22 on the following page, a greater percentage of minority- and women-owned firms indicated difficulties learning about bid opportunities, including ADOT opportunities, compared with majority-owned businesses. For example, the percentage of minority-owned businesses reporting that they experienced difficulties learning about ADOT bid opportunities (29%) was substantially higher than that for majority-owned firms (17%). About 23 percent of white women-owned firms indicated that they experienced difficulty learning about ADOT bid opportunities.

Learning about local agency bid opportunities. Results were similar for questions concerning learning about local government bid opportunities. Relatively more minority- and women-owned firms reported difficulties learning about local agency bid opportunities (28% and 26%, respectively) compared with 18 percent of majority-owned firms.

Learning about private sector bid opportunities. About 27 percent of MBEs and 29 percent of WBEs reported difficulties learning about private sector bid opportunities. Only 16 percent of majority-owned firms reported such difficulties.

Learning about subcontracting opportunities. MBEs and WBEs were also more likely than majority-owned firms to report difficulties learning about subcontracting opportunities. Twenty-six percent of minority-owned firms and 32 percent of white women-owned firms indicated such difficulties compared with 17 percent of majority-owned firms. The bottom portion of Figure H-22 presents these results.

Figure H-22.
Responses to 2014 availability interview questions concerning learning about work,
Arizona MBE, WBE and majority-owned firms



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

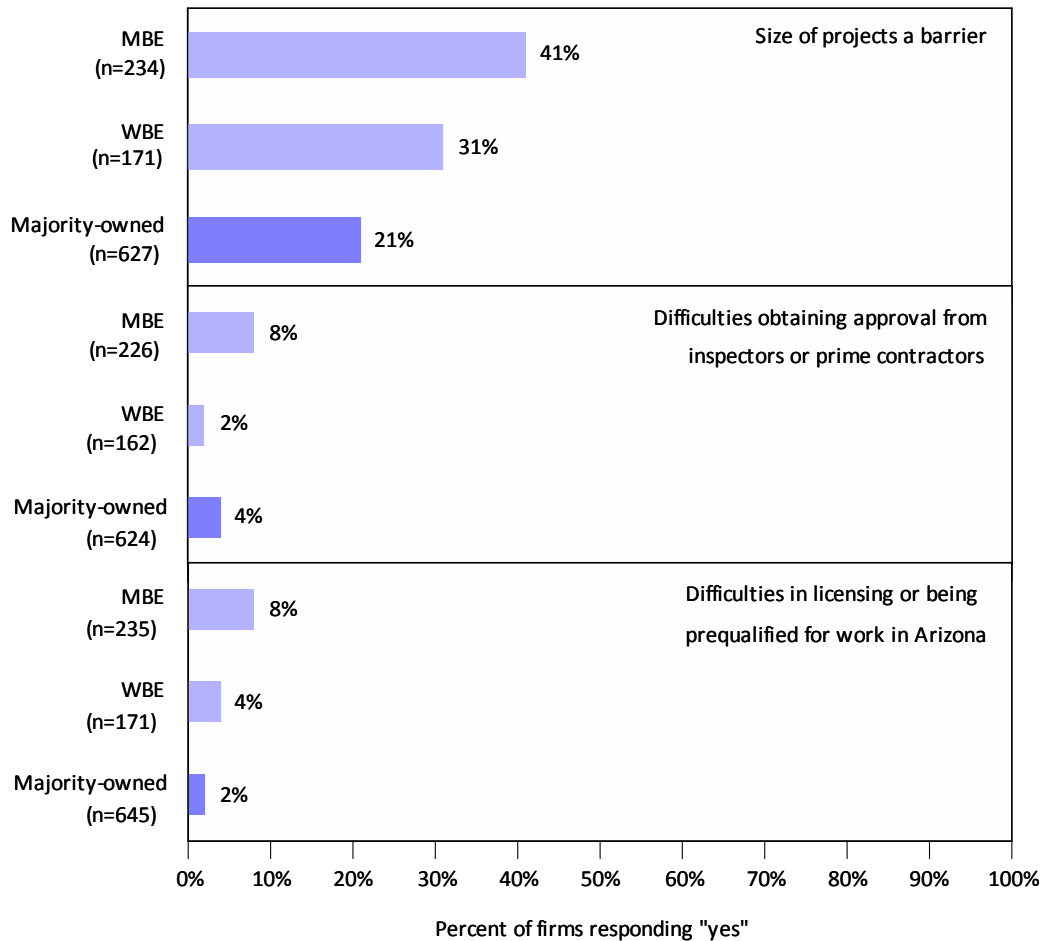
Size of projects. Interviewers also asked business owners and managers whether size of projects presented a barrier to bidding. About 21 percent of majority-owned firms reported that size of projects was a barrier. A greater percentage of MBEs (41%) and WBEs (31%) reported that size was a barrier to bidding. Figure H-23 shows these results.

Obtaining final approval on work from inspectors or prime contractors. Few firms indicated difficulties regarding inspections or approval of work (see Figure H-23).

Licensing or prequalification for work in Arizona. As shown in Figure H-23, very few firms reported difficulties in licensing or being prequalified for work in Arizona.

Figure H-23.

Responses to 2014 availability interview questions concerning size of projects, approval of work, and licensing and prequalification, Arizona MBE, WBE and majority-owned firms



Note: "WBE" represents white women-owned firms, "MBE" represents minority-owned firms and "Majority-owned" represents non-Hispanic white male-owned firms.

Source: Keen Independent Research from 2014 Availability Interviews.

Summary of analysis of availability interview questions concerning barriers. The availability interviews suggest that relatively more minority- and women-owned firms have difficulty learning about bid opportunities, including those at ADOT and local agencies. MBEs and WBEs are also more likely to indicate difficulty learning about subcontracting opportunities from prime contractors.

Relatively more minority- and women-owned firms than majority-owned firms reported that size of projects was a barrier to bidding.

Only a few firms said that they had difficulties obtaining final approval of work from inspectors or prime contractors. Just a few businesses indicated difficulties in licensing or being prequalified for work in Arizona.